REMARKS

The final Official Action mailed May 21, 2002 has been received carefully reviewed. Claims 1 is herein amended and new claims 20-23 have been added. Thus, claims 1-23 of the application are presently pending. Support for the amendments to claim 1 and newly added claims 20-23 can be found at page 11, lines 5-8, and working examples 1-7.

The Applicants wish to thank Examiners Stockton and Ramseur for the courtesies extended during the interview of August 20, 2002. As a result of that interview and in light of the amendments presented above, reconsideration and withdrawal of the currently pending rejections is requested for the reasons advanced in detail below.

The Applicants gratefully acknowledges the Examiner's rejection of claims 1-19 under 35 U.S.C. § 112, first paragraph, on the basis the specification does not support the amendment of claim 1 to recite a molar-equivalent ratio of chlorinating agent to the compound of formula (I) of 3:1 and molar-equivalent ratio of chlorinating agent to the compound of formula (II) of 2:1. It is respectfully submitted the amendment of claim 1 in this fashion resulted from a typographical error which is evident upon a reading of the specification at pages 8 and 9, and considering that the Applicant's in their Amendment of February 25, 2002, at page 4, first paragraph, describes the claim 1 as including a chlorinating agent in relation to formulae I and II as being 2:1 and 3:1, respectively. Accordingly, claim 1 is amended herein to recite a molar equivalent ratio of chlorinating agent to the compound of formulae I and II as 2:1 and 3:1, respectively. In view of this amendment, the Examiner's reconsideration and withdraw of the rejection of claims 1-19 under 35 U.S.C. 112, first paragraph, is respectfully requested.

The Examiner has further rejected claim 1-17 and 19 under 35 U.S.C. 102(b) as being anticipated by Hahn et al. (U.S. Patent No. 5,453,507), and rejected claims 1-19 under 35 U.S.C. 103(a) as being unpatentable over GB 2,308,364 to Kim et al and U.S. Patent No. 5,453,507 to Hahn et al., each taken alone or in combination with each other. Specifically, the Examiner provides that Hahn et al. (Example 6 in column 5) disclose a process of making 2-methyl-4-isothiazoline-3-one wherein N,N'-dimethyl-3,3'-mercaptopropionamide is reacted with sulfuryl chloride in methylene chloride, and wherein the molar ratio of the chlorinating agent to the N,N'-dimethyl-3,3'-mercaptopropionamide is 2:1.

However, the invention of claim 1, as herein amended, and new claim 20, includes a process of making 2-methyl-4-isothiazoline-3-one employing chlorine (Cl_2) as the chlorinating agent in a solvent in which hydrogen chloride is insoluble or has low solubility, wherein the 2-alkyl-4-isothiazoline-3-one of Formula III produced is essentially free of 5-chloro-2-alkyl-4-isothiazoline-3-one or contains less than 1.0% of 5-chloro-2-alkyl-4-isothiazoline-3-one. (See, e.g., Application, page 11, lines 5-8 and working examples 1-7).

In contrast, Hahn et al. teach only the use of sulfurylchloride (see column 3, lines 6-68; and all Examples) as the chlorinating agent of their invention. None of the examples of the patentees teach purity yields of 2-alkyl-4-isothiazoline-3-one of greater than 92.5:%. That is, the undesired 5-chloro-2-methyl-4-isothiazolin-3-one and 4,4,5,5-tetrachloro-2-n-octyl-4-isothazolin-3-one are still present at unacceptable mutagenicity levels in Hahn et al, as discussed in the specification at pages 1-3. Particular attention is directed to Examples 4, 6, 7, 9, 10 and 13-17 each of which are an example of the closest prior art and teach reacting N,N dimethyl 3,3'-dithiodipropionamide (0.1 mol) in either chloroform, dichloroethane or trichloroethane (each within the scope of the claimed solvents), with sulfurylchloride (0.2 – 0.3 mol) to obtain 2-methyl-4-isothiazoline-3-one at a purity of at most 92.7%. This purity yield is significantly below that presently claimed.

Further, Kim et al, while teaching the use of Cl_2 or sulfurylchloride as the chlorinating agent in combination with a mixed solvent system (again some of which include those exemplified in the instant claims) for reaction with N,N dimethyl 3,3'-dithiodipropionamide (A-2), desires that the resultant product include the presence of both 2-alkyl-4-isothiazoline-3-one (I) and 5-chloro-2-methyl-4-isothiazolin-3-one (II) (see page 6). That is, Kim et al teach (Tables 1 and 2) that both the Cl_2 (comparative example 1) or sulfurylchloride (examples 1-22) chlorinating agents used result in products which contain 5-chloro-2-methyl-4-isothiazoline-3-one(II) in appreciable amounts well above that instantly claimed. For example, Kim et al employ sulfurylchloride as the chlorinating agent and a compound of either instantly claimed Formula I or II in ratios of about 2:1 to about 5.6:1 in each of its examples (examples 1-22) and yet teaches that 5-chloro-2-methyl-4-isothiazoline-3-one(II) is formed in preference to the 2-alkyl-4-isothiazoline-3-one. Such a teaching is contrary to the present claims which require Cl_2 as the chorinating agent in a solvent which is insoluble or only slightly soluble for hydrogen

chloride. Kim et al further teach that when Cl_2 is employed with ethyl acetate as a solvent where the ratio is 3:1 (that is, similar to our comparative example in the instant specification) the 5-chloro-2-methyl-4-isothiazoline-3-one(II) is again formed in preference to the 2-alkyl-4-isothiazoline-3-one, but to a lesser degree which Kim et al states is undesirable.

Consequently, there is no teaching or suggestion in either Hahn et al or Kim et al of making 2-alkyl-4-isothiazoline-3-one by the processing steps presently claimed to provide the purity yield claimed. In contrast, each of the patentees suggest carrying out the processes to yield levels of 5-chloro-2-methyl-4-isothiazoline-3-one(II) that are greatly in excess of the levels presently claimed.

In summary, the presently claimed inventive process requires the use of chlorine (Cl_2) as the chlorinating agent in conjunction with a solvent in which hydrogen chloride is insoluble or has low solubility wherein the 2-alkyl-4-isothiazoline-3-one of Formula III produced is essentially free of 5-chloro-2-alkyl-4-isothiazoline-3-one or contains less than 1.0% of 5-chloro-2-alkyl-4-isothiazoline-3-one. Neither Hahn et al or Kim et al teach or suggest this novel combination of chlorinating agent and solvent to achieve the purity yields claimed. Therefore, since Hahn et al fail to recite each and every feature of the claimed invention, Hahn et al. is not a proper reference under 102(b). See MPEP 2131 and *In re Donohue*, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985).

Further, since neither reference teaches each and every feature of the claimed invention, nor suggests the use of chlorine (Cl_2) with the particularly claimed solvent to achieve the purity yields claimed for 2-alkyl-4-isothiazoline-3-one of Formula III, a *prima facie* case of obviousness has not been established for either Hahn et al or Kim et al. (see MPEP Chapters 2142 and 2143) In addition, there is no likelihood of success of achieving the claimed invention upon combining the teachings of Kim et al with Hahn et al since:

1) Kim et al explicitly require that the processing be carried out to have significant amounts of 5-chloro-2-alkyl-4-isothiazoline-3-one in the final product; while

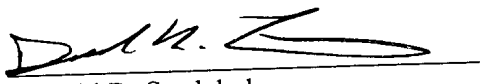
2) Hahn et al. (column 3, lines 63-67) teach 5-chloro-2-methyl-4-isothiazoline-3-one can be present but is an undesirable impurity with corrosive properties.

These interests are completely incompatible and provide no suggestion/motivation or likelihood of success in achieving the claimed invention even if combined.

As shown in Table 2 (page 14) of the present application, the presently claimed method of producing 2-alkyl-4-isothiazoline-3-one yields 2-alkyl-4-isothiazoline-3-one with very high selectivity and with virtually no content of the mutagenic substance 5-chloro-2-alkyl-4-isothiazoline-3-one. More specifically, the method of the claimed invention is capable of producing > 99.9 mol % 2-alkyl-4-isothiazoline-3-one and < .10 mol % 5-chloro-2-alkyl-4-isothiazoline-3-one. (See Application, Working Example 1 on page 11). The maximum yield of 2-alky-4-isothiazoline-3-one obtained by the method of Hahn et al., on the other hand, is only 92.7 mol %.. Therefore, neither singly or in combination do the teachings of Hahn et al and Kim et al render the claimed invention obvious to one of ordinary skill in the prior art, and consequently the rejection of claims 1-19 under 35 U.S.C. 103(a) is improper and must also be withdrawn.

In view of the foregoing, Applicants respectfully submit that the present application should now be in condition for allowance. The Examiner's reconsideration and withdrawal of the present rejections is respectfully requested. An early Notice of Allowance is courteously solicited. However, should the Examiner believe that there are further issues remaining to be resolved to place the application in condition for allowance, she is invited to contact the undersigned.

Respectfully submitted,



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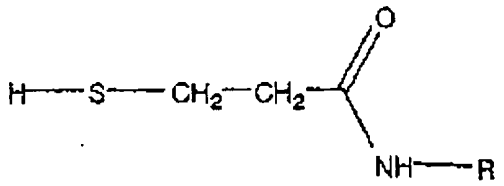
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

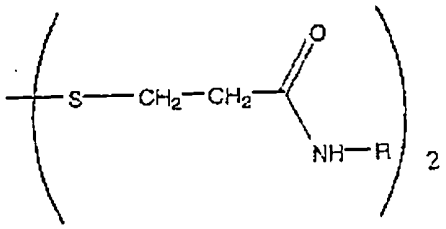
Please amend claim 1 to read as follows:

1. (Twice Amended). A method of producing 2-alkyl-4-isothiazoline-3-one represented by the general formula (III),

wherein the compound represented by formula (I),



or alternatively, the compound represented by formula (II),



is reacted with chlorine (Cl_2) as a chlorinating agent in a solvent in which hydrogen chloride is insoluble or has low solubility,

wherein the molar-equivalent ratio of said chlorinating agent to the compound of formula (I) is 2:1 [3:1], or alternatively,

wherein the molar-equivalent ratio of said chlorinating agent to said the compound of formula (II) is 3:1 [2:1], [and]

wherein R in the compounds of formulas (I), (II), and (III) represents C1 to C8 alkyl groups or aralkyl groups, and

wherein the 2-alkyl-4-isothiazoline-3-one of Formula III produced is essentially free of 5-chloro-2-alkyl-4-isothiazoline-3-one.